CS246 Review Session

Topics

- True/False Section
- Bash
- Regex+Globbing
- Short Answer C++
- Full Question C++
- Full Big 5 Question

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Questions?

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True/False Section

True or False?

1. After this statement is executed, space for *p, the value p is pointing to, is allocated on the heap:

```
int *p = new int;
```

2. This code causes 3 to be printed:

```
int main(){
        int i = 3;
        int *p = &i;
        *p = 5;
        cout << i;
}
```

True or False?

1. After this statement is executed, space for *p, the value p is pointing to, is allocated on the heap: True

```
int *p = new int;
```

2. This code causes 3 to be printed: False, it prints 5

```
int main(){
        int i = 3;
        int *p = &i; //Sets a pointer to the address of i
        *p = 5; //Dereferences address of i and sets it to 5
        cout << i;
}
```

True or False?

3. This code causes 2 to be printed:

```
void f(int &a, int *b, int c){
        a = 1; *b = 2; c = 3;
}
int main(){
        int i = 0;
        f(i, &i, i);
        cout << i;
}
```

True or False?

3. This code causes 2 to be printed: True

```
void f(int &a, int *b, int c){
        a = 1; *b = 2; c = 3; //i gets set to 1, then 2. c is a copy.
}
int main(){
        int i = 0;
        f(i, &i, i);
        cout << i;
}
```

True or False?

3. The following code prints out 4 5

```
int a = 1;
int b = 2;
int &f(int &c){
        c = 4;
        return b;
}

int main(){
        f(a) = 5;
        cout << a << " " << b;
}
```

True or False?

3. The following code prints out `4 5 True`

```
int a = 1; //Global
int b = 2; //Global
int &f(int &c){//f returns a reference to an integer
        c = 4; //Parameter c was set like int &c = a, so “a” updates to 4
        return b; //Returns a reference to b because it is global
}

int main(){
        f(a) = 5; //Returned reference to b is set to 5
        cout << a << " " << b;
}
```

True or False?

5. Can we create a reference to a reference?

```
int x = 5;
int &y = x;
int &&z = y;
```

6. Can we create a pointer to a reference?

```
int x = 5;
int &y = x;
int *z = y;
```

True or False?

5. Can we create a reference to a reference? `False`

```
int x = 5;
int &y = x;
int &&z = y; //This is an rvalue reference
```

6. Can we create a pointer to a reference? `False`

```
int x = 5;
int &y = x;
int *z = y;
```

True or False?

7. Can we create an array of references?

```
int x = 5;
int x2 = 12;
int &*y = new int&[2]{x, x2};
```

8. Can we create a reference to a pointer?

```
int *x = new int[2]{1,2};
int *&y = x;
```

True or False?

7. Can we create an array of references? `False`

```
int x = 5;
int x2 = 12;
int &*y = new int&[2]{x, x2};
```

8. Can we create a reference to a pointer? `True`

```
int *x = new int[2]{1,2};
int *&y = x;
```

3 Bash

Bash

Write a bash script that prints out lines in files in the current directory that contain the string `"disco."` Assume the current directory only includes files.

Bash

```
#!/bin/bash

for x in $(ls); do
        echo $(egrep "disco\." $x)
        echo ""
done
```

Bash

Write a program called `checkSum` that adds up all the numbers in a file and checks if it is larger than an input sum. The program takes in two parameters, the first being the name of a file containing whitespace separated numbers, and the second the sum to beat.

Bash

```
#!/bin/bash
sum=0
sumToPass=$2
for x in $(cat $1); do
        sum=$((${sum}+${x}))
done

if [ $sum -gt $sumToPass ]; then
        echo "Pass"
else
        echo "Fail"
fi
```

4 Regex+Globbing

Regex+Globbing

Write a regular expression to match:

`https://www.freddddddddyfreaker.gov/blog?post=123`

Where:

- `https://` and `www.` are both optional
- There can be 2 or more `d`s in `freddy`
- The post id can be at most 3 digits long

Regex+Globbing

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`https://www.freddddddddyfreaker.gov/blog?post=123`

Where:

- `https://` and `www.` are both optional
- There can be 2 or more `d`s in `freddy`
- The post id can be at most 3 digits long

```
(https://)?(www\.)?fredd+yfreaker\.gov/blog\?post=[0-9][0-9]?[0-9]?
```

Regex+Globbing

Use `ls` and a globbing pattern to print out all the files with extension `.txt`. Then, use `ls` and `egrep` to print out all files with extension `.txt`:

Regex+Globbing

Use `ls` and a globbing pattern to print out all the files with extension `.txt`. Then, use `ls` and `egrep` to print out all files with extension `.txt`:

```
ls *.txt
```

is equivalent to

```
ls | egrep "^.*\.txt$"
```

Regex+Globbing

Use `ls` and a globbing pattern to print out all files with the form `abc.xyz`, where `xyz` is a three character extension. Then, use `ls` and `egrep` to achieve the same result:

Regex+Globbing

Use `ls` and a globbing pattern to print out all files with the form `abc.xyz`, where `xyz` is a three character extension. Then, use `ls` and `egrep` to achieve the same result:

```
ls abc.???
```

is equivalent to

```
ls | egrep "^abc\....$"
```

5 Short Answer C++

Short Answer C++

What is wrong with this code?

```
Node::Node(int data, Node *next = nullptr) : data{data},
next{next} {}

void foop(int i){ //does something with the int}
void foo(Node n){ //does something with the Node}

int main(){
        foo(123);
}
```

How do we fix the issue?

Short Answer C++

1. Node uses a single argument constructor, and could misinterpret an integer input as a Node input

2. Using the `explicit` keyword for the constructor

```
explicit Node::Node(int data, Node *next = nullptr) : data{data},
next{next} {}
```

Short Answer C++

What is the problem with defining an outstream operator as a member function?

Why is defining an addition operator as a member function fine?

```
struct Node{
        int data; Node* next;
        ostream& operator<<(std::ostream & out); //Why is this bad
        Node operator+(const Node& n); //And this is okay
}
```

Short Answer C++

What is the problem with defining an outstream operator as a member function?

Conventionally, the outstream object has to be first. If you define it as a member function the object will have to be first to make the outstream operator work.

Why is defining an addition operator as a member function fine?

Assuming we're adding two of the same type of object, n1 + n2 is the same as n2 + n1, so there it is fine to define this a operator as a member.

Remember that member functions assume the first parameter is `this`

Short Answer C++

Write a proper output operator for the Node class

Short Answer C++

```
ostream& operator<<(ostream & out, const Node &n){
        for(const Node *p = &n; p != nullptr; p = p -> next){
                out << p -> data << " -> ";
        }
        out << "nullptr";
        return out;
}
```

Short Answer C++

Write an constant multiplication operator for the node class that multiplies every element within it by the constant. Make sure it works no matter what side the constant is on.

Short Answer C++

```
Node operator*(const Node &n, int v){
        Node addedN = n; //Invokes Copy Constructor
        for(Node *p = &addedN; p != nullptr; p = p -> next){ //Iterates
                p -> data *= v;
        }

        return addedN;
}

Node operator*(int v, const Node &n){
        return n * v; //Calls defined * operator
}
```

6 Full Answer C++

Full Answer C++

Write a program to read in tokens from a file named words.txt until EOF. Each word should be output on a new line

Full Answer C++

```
#include <iostream>
#include <fstream>

using namespace std;

int main(){
    ifstream file{"words.txt"}; //ifstream file; file.open("words.txt"); … file.close();
    string word;
    while (file >> word){
        cout << word << endl;
    }
}
```

Full Answer C++

Write a header file called mario.h for a class called Mario. Do not write any implementation for any functions. This class keeps track of Mario's position with the integer parameters x and y, his current integer speed, and a string representing his form. Mario can be "small", "big", or "fire".

The class has two constructors, one that takes in parameters for his position and his form, and one that takes just his form. Make sure that there is no ambiguity with the single argument constructor. The class should also have a method called takeDamage(). Ensure that this file can only be included once.

Full Answer C++

```
#ifndef MARIO_H
#define MARIO_H
#include<string>
struct Mario{
    int x;
    int y;
    int speed;
    string form;
    Mario(int x, int y, string form);
    explicit Mario(string form);
    void takeDamage();
}
#endif
```

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Full Big 5 Question

Full Big Five Question C++

Write the implementation for the class: Yakuza See example file for struct definitions. Implement all necessary constructors, as well as an outstream operator for the Yakuza class.

See repo for full solution.

Exam Taking Advice

- Read the entire exam before you start
  - One strategy is to start with the questions you find easiest and work your way up
  - Another is to work on a question until you get stuck and then move on
- Don't get caught up in the details of your answer
  - Answer a question even if you're not sure of 100% of the syntax
- Never give up